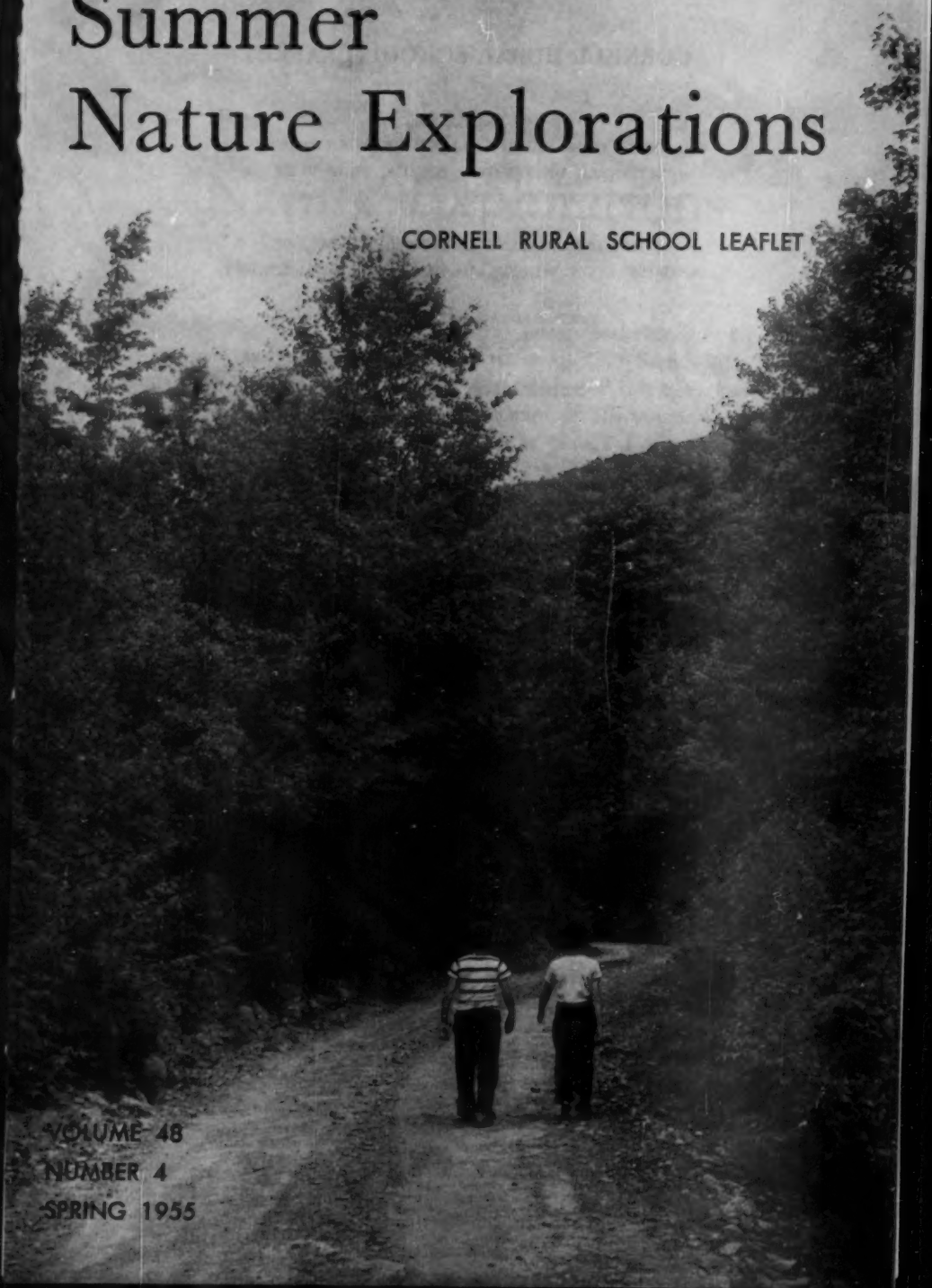
Summer Nature Explorations

CORNELL RURAL SCHOOL LEAFLET



VOLUME 48
NUMBER 4
SPRING 1955

CORNELL RURAL SCHOOL LEAFLET

PUBLISHED BY
THE NEW YORK STATE COLLEGE OF AGRICULTURE AT
CORNELL UNIVERSITY, ITHACA, NEW YORK
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A publication of the
New York State College of Agriculture,
a unit of the State University of New York,
at Cornell University

Summer Nature Explorations

By Eva L. Gordon

Summer vacations are fun. Exploring nature is fun, too, especially outdoor exploration in a season when, on most days, it is a joy just to be out-of-doors.

Summer is a busy time for animals, and a time of active growth for most plants. There is much to observe, to discover, and to think about as you "watch living things live." Or, you may be interested in rocks, or the weather, or the stars. You can explore *something* in the world of nature wherever you spend your summer: at home, in a cottage at the lake, in camp, at the seashore, traveling, visiting in the country, or in a city.

You will want to choose just the right nature explorations for *you*. So, I have tried in this leaflet to do two things: (1) to help you see how to discover things to explore wherever you are; and (2) to suggest *some* questions and *some* things to do about *some* things in nature. Some of these explorations you may have made. Some you may decide to try. Some may give you ideas for the very best discoveries of all—your own.

The places I chose are (1) your own yard; (2) a farm; (3) a wet place; and (4) the seashore. The questions and the things to do are only samples. You will think of many others. You may have an opportunity to investigate other places—a park, a playground, the camp you attend, a museum or a zoo, a forest, a deep gorge, a roadside, mountains, or unfamiliar places you visit on your vacation trip. You may have special nature fields you wish to investigate. But, wherever you explore, and whatever you wish to discover, you need first to look about you; then to wonder about something; then to decide how to go about answering your questions or settling your problems. Then, find the best answers you can, and test them or compare them with what others have discovered—

and perhaps explore some more.

Nature exploration can be never-ending fun. It can help many of you Girl Scouts, Boy Scouts, Camp Fire Girls, 4-H-ers, or members of other groups, to earn honors, win merit badges, or advance to higher ranks. When you come back to school next fall, you will have many adventures and experiences—and probably many questions—to share with the other nature explorers in your class. Perhaps your summer's investigations may lead to an exhibit at the county fair, a school fair, or next year's science fair. I know boys and girls whose nature explorations have won them important science achievement awards. One high school boy who studied the fish of Coney Island discovered things the Army found extremely useful. What you learn may be valuable to you always.

Use this Leaflet to help you plan *your* summer nature explorations. If you have not already done so, choose some *thing*, such as birds, or trees, or stars, or some *place* to explore. Then before vacation comes, try to do what good explorers always do: consider what you wish to look for and to do; decide what materials you may want to use; look for helpful books or other useful materials in your library; talk over your plans with your teacher and your schoolmates, and perhaps try to find someone who can help you when you need help. Then start exploring!

THIS is John Q. Thoughtless, a nice enough gent but, — well, he is thoughtless. He and others like him are spoiling America's parks, forests, and roadsides.

THE parks and forests are your vacation living room. Every year there are more and more people. Every year our parks get harder use. If some of us behave like John Q. Thoughtless, the rest will have to suffer—and so will future generations. HAVE YOU SEEN JOHN Q. LATELY?

From Nature Conservancy.

Be a Good Conservationist

Leave the places you explore at least as beautiful and as interesting as you found them, and the plants and animals unharmed. Don't be John Q. Thoughtless, or a litterbug (one who leaves trash and rubbish wherever he has been).

Explore Your Own Yard

ENOUGH for a whole summer—and more—of nature exploration may be just outside your door, in your own yard. How many of these do you have: a lawn, some trees and shrubs, a garden or a flower bed, a weedy waste place? Once you begin to develop a real explorer's eyes—and to use your other senses as well—any one of these places probably could keep you interested and busy day after day.

Suppose you like animals. You step out on the back porch early some morning. You hear a bird call that you do not recognize. You start exploring and find that it is a young robin. I remember how long it took me to make that discovery. You see a dewy spider web glistening in the sun. The spider is on it. What is she doing? At another time you find holes in a porch chair, in which the screws are sunk, plugged with mud. Who did it (a wasp, I learned), and why? You will discover for yourself many other things worth investigating, but on pages 13 to 18 are some you may not think of.

You may be interested in plants. Then no one needs to tell you about the fun of making them grow, nor how much there is to learn about them: the ways they grow; how much sun or shade they need; the best kind of soil for each of them; the differences in their flowers, or fruits, or seeds; the insects that harm or help them; the uses we and other living things make of them. On pages 18 to 22 you may find new things you would like to try. For example, do some sweet-scented flowers seem to give off their odors most strongly at special times of day; some in bright sunlight, others at dusk?

You can study weather at home, too. At night you can learn about the stars and other sky wonders. You may have a stone terrace, a rock garden, or just stony soil. How many different kinds of rocks can you find at home? Even a gravelled driveway may prove worth exploring. One of my friends found nearly a dozen kinds of rocks, including a few fossils, in hers. Look on pages 23 to 26 for more ideas.

You may have many surprises. The better you know your home area, the more interesting, unexpected things you are likely to discover. *Lawn Laboratories*, the Leaflet for Fall 1948, was full of things to do and to watch. Probably, too, you can make a place at home to do experiments,

to make and do things (pages 27 to 31), or to keep things, especially living things, that you wish to watch closely.

Henri Fabre, a great French naturalist, spent much of his lifetime exploring around his home and experimenting with the animals that lived there, particularly the insects. Dr. Frank Lutz, whose field guide to insects you may have used, once wrote a whole book about just the insects that visited the city lot on which he lived. Edwin Way Teale is another nature explorer who observes much near home, and writes delightfully about his discoveries. Perhaps your librarian can help you find books, for rainy days, by these and other "home explorers."

Explore a Farm

Boys and girls who can explore a farm are lucky—there are so many things to do, to see, and to learn, and so many kinds of places to investigate. If you are one of these fortunate persons, you might begin your exploration by thinking of all the different kinds of places you can visit. Use the following suggestions if you wish, but once you begin to look about, you will surely need no help to discover interesting things to do.

Farm Animals

Probably no one could say how many kinds of animals, domestic and wild, you could observe on "your" farm. Let's look at some domestic mammals first. Many of you know well how to feed, care for, and profit from some of these animals. Perhaps some of you are raising some particular kind as a 4-H project. Such questions as the following are not for you, but for other explorers who do not know domestic mammals so well. Did you ever watch a cow chew her cud —watch closely enough so that you could describe just what she does? Does a cow get up front legs first or front legs last? How about a horse? Does a horse have eyelashes? Does a pig's tail curl to the right or to the left? Do you know the "feel" of a calf's tongue? What do these animals do to make themselves more comfortable on very hot days? What do they do during hard rains? Do you know which can swim?

Are there other domesticated mammals on your farm: goats, sheep, dogs, cats, rabbits, others? What other kinds of domestic animals, not mammals, can you

observe: bees, chickens, ducks, geese? others? What new things can you learn about them? How does each one drink? What does each one eat? Have you discovered small interesting ways by which you can recognize individual animals?

Fields and Fencerows

These are good places to observe plants and animals that live in the open. More than 70 kinds of weeds have been found on just one farm. Don't expect to learn them all by name, but learn a few. Do you find some beautiful enough for bouquets? Do any close at night or in wet weather? How many kinds of grasses can you find? Perhaps you can gather wild strawberries or other tasty tidbits. What insects visit flowers in bloom? How many kinds of insects can you capture? Look for mice and their nests. You may find an occasional snake. What kinds of birds do you see? What do you see them do? Can you find any nests? (Be careful not to go close enough to disturb nests if they are in use.) What other kinds of animals can you find?

The Farm Woodlot

One of the best ways to explore a woodland is to find a comfortable spot, then to sit quietly, and look, listen, and sniff. At first you may think that there is nothing to see, or hear, or smell. But then a red eft may creep out from the damp leaves under the log on which you are sitting. A rustle of dry leaves may call your attention to a jumping mouse. I remember being almost unwilling to believe that any mouse *could* have such a long tail. Or, you may notice a faint, sweet scent, and find the lovely, velvety, white flowers of partridge berry. These were some of my woodland discoveries. Yours may be different;

but whatever they are, I am sure you will enjoy and remember them.

Explore in different spots and at different times of day. Return to each place once in a while to note how things have changed and to discover things you missed on earlier visits. Visit your woodland in wet weather and in dry times. Learn what uses are made of it. But every time you go there, remember to do your part to preserve it so that you and other persons—and other living things, too—may continue to enjoy and use it.

An Old Apple Tree

A good tree for shade, good to climb, with tempting fruit, and the home of many creatures! What more could a nature explorer ask? Birds feed and nest there. Some mammals visit it—when and for what? But insects, harmful and beneficial, probably are its most important population. What can you learn about them? *Apple Tree Animals*, the Leaflet for March 1948, will help.

Other Explorations

Those of you who are just farm visitors will find much to explore about farm work, farm crops and other products, and the soil and the water which are such important natural resources. What kinds of work do farmers do in summer? What machines and tools do they use? Aren't you amazed at the kinds of things these machines can do? Are there ways in which you can have the fun of helping with farm work? What crops are raised? How are they harvested? For what are they used? What other products does the farm produce, milk, for example? How are they cared for and prepared for market? What farm activities depend upon the soil? Which do not? What can you learn about the kinds of soil, how it is prepared for planting, how it is conserved? From what source (or sources) does the farm water supply come? Where and how is it used?

Certainly a farm is a wonderful place to explore, whether you live on it or just visit it.

Explore a Wet Place

Do you plan to explore a pond? Before you begin to investigate small problems there, take a questioning look at the *whole* pond. Stop while you are still a short distance from its shore. Sit, or stand silently, and explore with your eyes, your

Sunlight reflected from a thick cover of duckweed, a small floating plant, gives this pond its snowy look

ears, and your nose. Try to select a place where you are partly hidden by plants or some other shelter. Do you see birds or other animals? hear sounds or get odors you cannot explain? Are dry-ground plants around you here? Do you recognize any of them? Do different kinds of plants appear between you and the open water of the pond?

As you move toward the shore do you notice plants that grow in soft, wet ground, then others that have their roots under water and their tops in the air? Did you brush against spearmint, smell it, and stop to taste a leaf? Have you frightened a bird or made a frog jump? Do any animals appear at the water surface or make disturbances in it? Are there tracks along the shore? Do you see dragonflies skimming above the water, perching now and then?

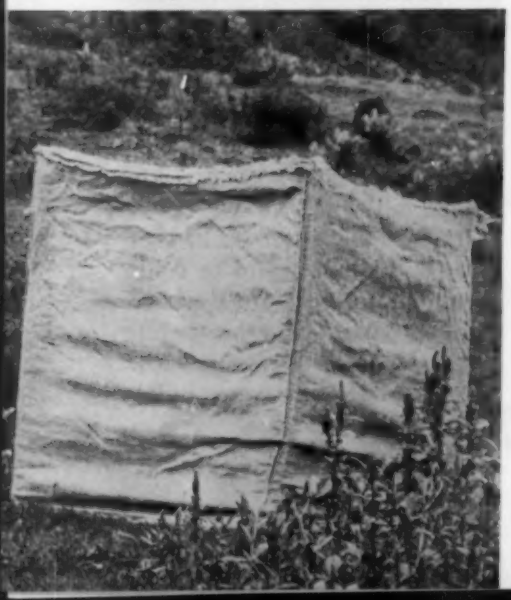
Find a place where you can make yourself comfortable and peer down into the water. Observe animals that live in it —their shapes and sizes, how they move, what they do. Do you see any that can travel on the water surface? How can they do this? Have you seen any fish? Look at the plants. Do some float or have floating leaves? Do some grow entirely under water? Do some have flowers? Pull out some underwater plants. What animals crawl out of the mass? Perhaps one of them will be a dragonfly nymph, not yet ready for life in the air.

Explore the water itself. Is it clear or murky? warm or cold? Does the temperature differ in different parts of the pond? Does the water have an odor? (Do *not* taste any water unless

you are sure it is safe to drink.)

When you have finished this over-all look, aren't you ready for many more explorations, of particular animals, of plants that are new to you, of the pond itself? You may want to capture some of the animals and take them home—in pond water and with some underwater plants—to put into an aquarium where you can watch them and learn more about them. Put in a stick or a stem that projects above the water. You may have captured a dragonfly nymph about to emerge and become a winged adult. Perhaps you can examine some of the water with a microscope. You may want to put up a blind near the pond so that you can watch birds or other animals where they live.

An easy-to-make blind (*see page 14*)



You can watch water animals and learn about water plants in a brook, a creek, or a river, as well as in a pond. A small stream, in which you can safely wade, is best. If it has a stony bed you will have fun turning over stones (always turn them back) and discovering the many kinds of creatures that cling to their undersides. Living in running water is different from living in the quiet water of a pond. What differences can you find among the animals and in the ways they live? among the plants?

Float toy boats, or sticks, or leaves, or anything else to see how they move in your stream. Do they ever go upstream? Find out how large an object your stream can move. Time its flow. One way is to tie a 50-foot string to some object that will float, drop the object into the water, then note how much time is required to extend the string to its full length. Study little gullies worn by your stream or by small streams that flow into it. How do freshly made and older ones differ? Can you find places where the water has cut into the banks and carried away soil, and other places where soil, pebbles, or other materials have been deposited? Can you explain why? Observe how water rolls sand and

stones about and smoothes their edges, how it forms sand bars, and changes shore lines. Build dams in your stream or in some other rivulet that is small enough and observe their effects. What can you learn about *erosion* by water as you explore a stream or a pond?

You may have an opportunity to investigate other freshwater wet places: a spring, a lake, a bog, a marsh (a wet area without trees), or a swamp (a wet area with trees or shrubs). Each kind of wet place has its own special population of plants and animals, although, of course, you may find some things in more than one kind of place. Each body of water is different from any other, and each constantly changes.

In summer, some waterways "go dry." If you know of one that does, you can have a most interesting experience watching the changes that take place. What happens to its inhabitants? Do any moist places remain? What effect does a sudden heavy rain have?

Have fun—safely—in and on water. Perhaps you go swimming. What other mammals swim? Do you know whether they have to learn how, as you did? What other mammals have you seen dive? Do you use a boat? What can you observe from it that you did not see from the shore? What other animals use things that float—water lily leaves, for example? Do you fish? What kinds do you catch? How much can you learn about the habits of each kind? What other creatures catch fish? Have you ever seen a kingfisher do it? a cat? any others?

Exploring waterways is fun. It can yield important knowledge about a natural resource essential to living things. Many persons make the study and management of waterways their life work. Perhaps you will be one of them.

Explore the Seashore

You are fortunate if you live near or can visit a sea beach. It is a wonderful place to explore and you can gather shells and other things that make interesting and attractive collections.

Above high tide level, grasses, sedges, trees, and other land plants grow. In the sand among the plants you may find the footprints of birds or other animals. Probably you will see many animals, too. Some of you may find

colonies of nesting sea birds. As you draw near, a great flock of them may rise into the air. Be sure to watch them only a few minutes. Harm may come to eggs or young birds if you keep the parent birds away too long.

Then, there is the sand to examine, with a magnifying glass, if you can. And did you ever evaporate sea water and observe the small crystals of salt and other minerals left behind? On some beaches you may find several kinds of rocks and minerals. You can watch waves and tides, and the changes they make. Boats of many kinds come and go—fishing boats that dock to unload their catch are especially interesting. Sea birds fly over the water, perch on piles, or feed along the shore. Did you ever see one catch a fish?

But most fascinating of all are the plants and animals that spend at least part of every day submerged in sea water. You can find and study many of them in the stretch of beach exposed when the tide goes out. Perhaps you can watch a crab eat a bit of some dead animal, or barnacles on a stone just covered with seawater snap back into their shells when the shadow of your hand passes over them. Seaweeds, all of them forms of algae, are the only plants that grow in the sea. You may find tiny ones that you scarcely recognize as plants. Others may be many feet long. They come in many colors and forms. You can make beautiful mounts of many of them. Sea animals belong to many groups, and their ways are as different as their appearance. Every tide brings in new specimens. It will require a long time to meet even the common ones, to say nothing of becoming acquainted with all their amazing ways.

Do You Like Animals Best?[1]

You may explore the lives and habits of animals in at least three ways. You can watch one animal closely to learn all you can about its ways of life. You can specialize on mammals, birds, snakes, insects, spiders, or some other group of animals. Or, you can observe many kinds of animals to see the different ways in which they eat, or travel, or find shelter, or are protected from enemies or other troubles. All three kinds of exploration are fun and valuable. You will want to do some of each, I think. Here are a few samples. But, first, you must find your animals.

Look for Signs of Animals

What evidence of animals of different kinds can you discover in the various places you explore? Look under (and then replace) rocks, old boards, pieces of metal or cardboard, or other things you find on the ground. Look for *animal homes,* but avoid disturbing them unless you are sure they are not in use. Look for *feeding places,* remains of food, gnawed spots on trees and shrubs, and holes in leaves, or flowers, or other plant parts. Search for *tracks and runways* —mammals, birds, snakes, turtles, crayfish, and many other animals may "write their autographs" when they walk over mud, soft earth, fine wet sand, or even dust. Some make paths where they travel regularly. Look for *droppings.* Watch for *feathers, bits of fur, bones,* and *other hard parts,* such as the wings or skeletons of insects, and for *dead animals*—some always lose their lives. Listen for *sounds* made by animals. Does your sense of *smell* inform you of animals other than skunks? What can you learn from these clues?

One-animal Explorations

Dallas Lore Sharp, in his book, *Summer,* says this about watching one animal: "First, select some bird or beast or insect that lives with you in your dooryard or house or near neighborhood, and keep track of his doings all summer long, jotting down in a diary your observations. You might take the white-faced hornet that builds the big paper nests in the trees; or the mud wasp, or the toad under the

[1] No pictures are in this section nor the two that follow. Learning what unknown things look like is part of your exploration, isn't it? Perhaps you can observe specimens of plants or animals in museums or in private collections that will help you even more than the pictures we could give you or you can find.

steps, or the swifts in the chimney, or the swallows in the barn. It hardly matters what you take, for every life is interesting." And, he adds, careful watching over a long time is almost certain to "reveal to you something no one else has seen."

Watch a Bird at Its Nest. An exploration you are sure to enjoy is watching a bird at its nest, or, even better, seeing a nest built and used. A good pair of field glasses is a big help. To mark a nest you have found, bend a branch of a nearby bush or tree so that it points to the nest. When you study a nest, remember not to make a path to it or disturb the plants nearby, especially leaves or branches that hide or shelter the nest. That would expose it to the weather, and perhaps attract some predator to it. Even a small disturbance, especially early in the nesting period, may cause the bird to desert its nest.

If you make a blind to hide in, you can watch from only a few feet away. So, get some burlap bags, rip out all the seams, and then sew the material together with carpet thread to give you a blind whose four sides are about 30 inches wide and 48 inches high. Next, sew on a roof of burlap. Obtain four poles about 5 feet long. Drive these into the ground in a square 30 inches on a side. Then drape the blind over them. Put a small box inside to sit on. For a peephole, push some threads apart with a pencil. (See page 10.)

At first set your blind at least 30 feet from the nest. Allow the parent birds to become accustomed to it. Move it a few feet closer every other day until it is about 6 feet away. Try to enter or move it when the parents are away.

When you are inside, remain as quiet as possible. If there are eggs in the nest, notice which adult comes to sit on them. How long does it sit there? Does it merely sit motionless? Does it seem to hear other birds? What happens when the mate comes near? Does the mate take a turn on the eggs? Some birds feed their mates on the nest. Do yours? How long are the eggs left uncovered?

When young are in the nest, you will observe much interesting activity. What causes the nestlings to open their bills for food? What does the adult do if the young do not open their beaks? How do the birds know whom to feed? What kind of food do they give the babies? You will be amazed at how often the parents feed. Why doesn't the nest become soiled?

Do the parents occasionally brood the young? Why? How do the nestlings react to strange birds near them? How soon do the young leave the nest? Do they look like their parents then? If not, how do they differ?

Keep a Pet. Perhaps the best pets for summer are those that you do not need to keep in cages: your dog or cat, the bird whose nest you watch, the chipmunk that lives in the stone pile, or the chickens you care for.

But many kinds of animals make good caged pets. Insects are particularly satisfactory. Ask your teacher to go over with you the section on "Animal Pets and Guests" in *Indoor Nature Studies,* the Fall 1954 Teachers' Leaflet. It suggests kinds of pets, cages, foods, and care. You should not keep any animal captive unless you know how to keep it healthy and comfortable, and are willing to take the trouble to do so. But you can learn much by caring for a caged pet. One boy I know discovered last summer that red-bellied snakes are born alive, not hatched from eggs the female snake lays.

Be a Specialist in—

New York Mammals. About 60 kinds of native mammals are recorded for New York State. How many can you discover in your area? What can you learn about each? The best times to observe them are at dusk and at dawn. Many are active mostly at night.

Summer Birds. A calendar of bird activities is a good way to record discoveries. How many nests in use can you find in June? Where was each? By the end of July, what young birds have you seen leave the nest and assume responsibility for their own food? Probably you will note August as a quiet month. Why? And by September, you will be watching fall migration. How many "new" birds can you learn during the summer? how many bird songs? how many bird ways?

Snakes. In July some kinds of snakes lay their eggs. Other New York State snakes give birth to living young in August. So, by late summer, you are likely to see many tiny snakes. Which kinds live near waterways? in meadows and fields? on leaf-covered ground in the woods? in rocky places? You do not kill every one you find, do you? Most are beneficial, few harmful. If poisonous snakes are in your area, your chief concern should be your own safety.

Turtles. How many kinds can you discover? In what different

kinds of places do they live? What can you learn about their habits? They are air-breathers—try to see one thrust its head out of water for a new supply of air. Many young turtles hatch in summer, from eggs laid on land.

Frogs, Toads, and Salamanders. By the end of June the first of the spring crop of tadpoles may have left the water. During June most bullfrogs and green frogs lay their eggs. What kinds of places do tiny toads and different kinds of froglets seek when they emerge from the water? In what kinds of places do you find salamanders?

Fish and Their Ways. Explorers in wet places can learn much about fish and their ways. Did you know that some kinds of fish make nests? If you know a pond in which sunfish live, try to find a nest to watch. In Ithaca, we would look for them from late May through June. Perhaps you can learn about other kinds of fish nest-builders, too. And, watch for a catfish male, in charge of his swarm of little "kittenfish." Before you go fishing, though, be sure you know your fish and the State conservation laws that protect them.

Insects. In his *Junior Book of Insects,* Edwin Way Teale wrote, "All around us, as soon as we come to know something of the wonderful life of the insects, we find absorbing things taking place. There . . . are many things yet to learn about their ways and abilities. . . . New discoveries are being made, all the time." He adds that boys and girls have made some of these, and can make many more.

So, why not begin your explorations by watching *living* insects? Probably you, like Mr. Teale when he was a boy, will have many exciting moments discovering such things as "half a dozen black ants busily 'milking their cows'—stroking the backs of green plant lice with their feelers to make them give drops of honey-dew." You may want to rear some insects in cages to watch them grow and change. You may find insect eggs, perhaps even lacewing eggs, and see a whole insect life history.

Study insects of different habitats: those of the rose garden, or the vegetable garden, or an apple tree, or a meadow, for example. And, if you collect insects, make your collection something more than just boxes of pinned insects. Make it a record of places you have explored and of discoveries you have made. A list of books about insects was published in *Insect*

Homes, the Leaflet for Winter 1953-54. (Insect homes would make a fascinating summer nature exploration.)

Other Invertebrate Animals. Spiders, snails, crayfish, clams, centipedes, millipedes, and many other small backboneless animals are easy to find, and interesting to watch. Have you ever watched a spider make a web, or seen a snail eat, for example?

Explore Animal Ways

Observe How Animals Travel. You might begin this exploration by noting that some animals fly, walk, swim, crawl, and so on. You could make lists of some that travel on no feet, 1 foot, 2 feet, 4 feet, 6 feet, 8 feet, and so on up to the thousand-leggers with their many feet. If you want to make a real investigation, however, you will go beyond making lists. Probably you know little about differences in the ways 2-footed animals use their feet—which ones hop, which walk, for example; or in the ways 4-footed creatures (or others with more feet) manage their legs. Are the 8 legs of a daddy longlegs all the same length? Have you thought how feet differ, and how they are fitted to do whatever they do—such as climb, or cling, or run rapidly? Or take flying. Birds, bats, beetles, and butterflies all fly. But their wings differ and they use them differently. If you can find *Over the Ground,* the Leaflet for January, 1945, you will discover ideas for many more explorations into this big subject. Can you find some animal that spends most of its life attached to one spot, unable to move about? It is possible to do so almost anywhere. How do crippled animals get along? Do any animals with wings, legs, fins, and so on use them for other purposes than just to travel? A daddy longlegs, for example, uses two of its legs to explore things.

Watch Animals Eat. You might call this exploration *Menus and Manners.* You may investigate such things as just what particular animals eat, what they seem to like best, how they locate their food, how they get it, and how they eat it. Let's think about what and how they eat, for example. Many eat only plant food, but they do not eat just any plant. Some eat only one kind or at most a few kinds; some specialize on leaves, or bark, or seeds, or some other part of a particular kind of plant. Animals that prefer animal food have similar likes and dislikes, although they are more likely to take what they can get.

Probably animals that include both types of food in their diet choose, too, when they can. What can you learn about the day-by-day menus of the animals you watch?

Animals use teeth, toothless beaks, sucking tubes, and many other "eating tools." But teeth, for example, differ, and are used differently. Horses, squirrels, and snakes all have them, but horses grind food with some of theirs, squirrels have special teeth for gnawing, and snakes do not chew with theirs. Do all eaters of nuts open them similarly?

Cats wash themselves after they have eaten. You should see a daddy longlegs clean its legs after it has devoured a bit of bruised fruit or something else. Do other animals have similar manners? Do any wash themselves or their food *before* they eat?

Other Explorations. You could start with a survey of the homes animals make or move into, then choose one type, such as holes, and really investigate it. Or, list the ways in which animals are protected from enemies or from the weather, then choose one way, such as camouflage, and learn the fine points of it. Or, study eyes, or ears, or tails, and how their owners use them. Or, observe how animals use their sense of smell, or hearing, or sight. Or, investigate when, where, and how they rest or sleep. Have you seen animals that seemed to be playing? Does their play ever become a fight, as it sometimes does with boys and girls? All these are only samples. You will think of others.

Do You Enjoy Plants?[2]

Places, Times, and Ways to Grow

Different kinds of plants grow in different kinds of places, such as water or wet areas, fields and grasslands, hilltops and valleys, forests and woodlands, and man-made places—farms, gardens, lawns, and parks. Some grow best in sunny places, others in shady spots; some in one type of soil, some in others. Different kinds bloom in June, and July, and August. List those you know in each kind of place you observe. Try to make your lists grow longer. Get acquainted with books or persons who can help you identify those you cannot name. Have a space in your

[2] A list of good books about plants appeared on pages 31 and 32 of *Woodlands in Spring*, the Leaflet for Spring 1954.

notebook where you can jot down something you discovered or enjoyed about each plant. Remember to record where and when you saw each. Notice especially which wild plants are rare. Of course, you will not pick them. Is something being done in the community to conserve them?

Choose some plant you can watch day by day. Write its diary through the summer. A plant, such as a bean, that you can start from seed is fun. So is a milkweed, a dandelion, a poppy, a fern, a tree, or almost any other kind of plant.

Summer Flowers

Before school closes, review (or study) flowers and their parts and how seeds develop. Pay special attention to how the parts of different kinds of flowers differ, and to how *pollination* (the transfer of pollen from stamens to pistils) takes place. Then examine summer flowers, both garden flowers and wild ones. You may not be able to figure out which parts are sepals or petals or stamens or pistils, especially in some garden flowers. You may discover much that is fascinating about the pollination of different kinds (page 22.) Seeds and fruits ripen from late spring to late fall. Watching them develop is interesting, too. Does every flower produce a fruit and one or more seeds? Notice especially flowers in clusters, such as milkweed. Note flowers that produce few seeds and those whose fruits contain great numbers of seeds. Before summer ends, you can observe some of the amazing ways in which seeds are scattered—perhaps some you will no longer see after school begins.

Make a flower calendar for some area you can visit often. Record (1) the name of the plant, (2) where it grows, (3) when buds appear, (4) when blossoms open, (5) when seeds are ripe—if they ripen soon enough. If you cannot name a flower or find someone who can tell you what it is, draw or paint it. You may take a specimen to press if you can see ten or more plants of the same kind nearby, or can take only a small part of the plant.

Notice *flower colors.* In some wild flower books summer flowers are arranged according to color: (1) blue, purple; (2) yellow, orange; (3) white or nearly so; (4) pink, red, magenta; (5) green or brown. How many kinds in each color group can you find? when? where? Must some kinds of plants be listed in more than one group because

they have flowers of more than one color?

Many summer wild flowers are small, but grow in large clusters. Queen Anne's lace is an example. How many such kinds can you find? Watch bees and other visitors to them. Do they visit (and perhaps pollinate) many flowers between flights?

Some blossoms, such as dandelion, daisy, sunflower, and thistle, are truly whole bouquets of tiny flowers. Botanists call them *composite* flowers. Many kinds bloom during the summer. Some are garden flowers; many are wild. How many kinds can you find? Ask your teacher to let you see the article about them in *Outdoor Nature Studies*, the Teachers' Leaflet for Fall 1953.

Learn to arrange flowers attractively. Summer is a good time for this. You may have flowers in your garden, and there are many kinds of wildflowers—weeds and others. Learn first which of these are abundant enough to be picked freely, which may be picked sparingly, and which not at all. Cornell 4-H Club Bulletin 98, *Flower Arrangement*, by E. F. Schaufler, will help you arrange your bouquets.

Perhaps some of you will prefer to specialize in a particular group of summer-flowering plants. Here are some suggestions, but I shall have to leave it to you to observe, then ask yourself questions about them, plan things to do, and find and test answers. *Weeds*—they are plants that grow where we do not want them. *Grasses*—almost any of you can find several kinds if you look and if you remember corn, barley, and other cultivated grasses. *Clovers*—some creep, some grow erect, their blossoms may be white, pink, red, or yellow, many are useful cultivated plants. *Garden vegetables*—learn how they blossom and produce seeds and perhaps what their wild ancestors are like and where they grow. *Trees, shrubs*, and *woody vines*—learn to know a few more than you do, the kind of place in which each grows, and its way of life in summer. Be sure to notice when its buds for next year's growth develop.

Flowerless Plants in Summer

Ferns, mosses, club mosses, horsetails, lichens, and liverworts, all are flowerless plants you may find in summer. They begin their lives as tiny dustlike bits called *spores*. In summer many *produce* spores that can become new plants like themselves. These spores are pro-

duced in special parts of the plants. Finding these parts, discovering differences among them, and learning how the spores are scattered are real explorations—not easy, but interesting. *Woodlands in Spring*, the Leaflet for Spring 1954, will help.

Algae and fungi are flowerless plants, too. You may find several kinds of algae in a pond. Late summer and early fall are especially good times to observe puffballs, mushrooms, and many other fungi and to learn about the spores they produce. Some fungi are good to eat, but others are dangerously poisonous. It takes expert knowledge to know which are which, so don't take risks with any of them.

Cut the cap off a full-grown mushroom, lay it underside down on paper, cover it with a glass. Next morning look to see what has happened. And try this. Find a bit of dry, curled-up moss, dig a piece of it, plant it in a shady place, and water it every day for a few days. Does it change?

Poisonous Plants

Learn to recognize the poisonous plants of the areas you explore. Know which are poisonous to touch as well as which are poisonous to eat. Cornell Extension Bulletins 191, 441, and 538 will help.

Food, Flavor, Medicine, and Dye

Most of you know that New York State Indians used many kinds of native plants for food. They prepared medicines from some, too. Others furnished dyes. Early settlers learned from the Indians about many of these, and how to find and prepare the useful parts. Other wild plants used in these ways, such as dandelion and black mustard, are not native, but "immigrants." Many wild plants still are gathered for one or the other of these uses. Nowadays, many persons raise herbs in their gardens to flavor foods. Are some wild plants used similarly? If you choose to explore one of these subjects, your first task will be to learn from books, or from persons who know, some plants to look for and some ways in which they may be used. Then, you may want to try to find and test a few wild foods or a few wild flavors; or even make and use a dye or two.

Grow Plants

Perhaps the very best way to learn about plants is to grow some. Can you raise a few vege-

Explore Earth and Sky, Too

The Sky Above You

June 21 is the longest day of the year. How long is it? (Your newspaper or an almanac will tell you.) Ask someone to measure your shadow at noon, Eastern Standard Time, on June 21. Then, on the first sunny day of each week through the summer, record these two things: the length of the day and the length of your noon shadow. How much does the length of the day change between June 21 and September 1? Is the sun at noon on June 21 lower or higher in the sky than on September 1? Watch and record how shadows of trees, buildings, or other objects change through a day. At what time does the shadow of a tree, for example, cover the largest area of ground? the smallest? When does it extend farthest northward? westward? eastward? Make similar observations through the summer. Do the areas grow larger or smaller as summer passes? Why?

Watch how the place of sunrise and sunset changes from June 1 to September 1. Observe from the same place each time, and use a hill, a tree, a building, or some other object on the horizon as a marker. Toward which direction does the sun seem to move?

Learn to tell time and direction by the sun. Some of you may wish to make and use an outdoor sundial. Many books on stars, and several of the books listed on page 32 will help.

Summer is a wonderful time to become better acquainted with the starry sky. You will need a good star book. Some were listed in *Sky Laboratories*, the Leaflet for Winter 1952-53. A flashlight makes a handy pointer, and also helps you to see your star maps.

Learn to recognize some constellations. Use the Big Dipper to help you locate the other polar constellations. Then become acquainted with summer constellations, one or two at a time. Are these star groups in the same position at the same time each night? Some evening, if you can, follow the course of those you know at intervals from darkness to midnight.

Locate and admire some of the bright stars of summer skies, such as Vega, Capella, Altair, Arcturus, Spica, Antares, and Deneb. They differ in color. Can you distinguish one that is blue-white? rosy red? white?

tables, have a small flower garden, or plant and care for a window or porch box? Terrariums (page 30) are interesting, too. Some of you may wish to start a small fern garden or a wildflower garden; but before you do, be sure to study such problems as proper soil, moisture, and light. And remember, persons who really like plants are plant protectors and conservers.

Caring for plants you grow gives you a good opportunity to observe and learn about animals —insects, hummingbirds, and others—that visit them: why they come; whether they help or harm your plants; and what you can do to encourage or discourage them.

If You Collect Plants

Learn to make really good collections that will help you to learn more about plants.

Special Quests

Here are a half dozen special things to look for or to do. *Some* explorer discovered each one. *You* may find for yourself many others just as wonderful.

Early in the summer look for seed pods of wild geranium. Why is the plant sometimes called *wild cranesbill*? You will see a wonderful way to scatter seeds if you can watch even one pod split into four strong springs and hurl the seeds away.

Don't miss the beautiful summer flowers of woodlands. Look for waxy, white Indian pipe in bloom. Discover how it changes as it goes to seed.

On some warm evening about sunset, try to see the swift opening of an evening primrose flower. Look in faded blossoms for a small moth that matches the flower's colors, and perhaps pollinated it.

Push a slender, stiff stem into the throat of an alfalfa blossom. Watch the stamens and pistil pop up into sight. A visiting bee causes the same thing to happen, and is dusted with pollen that may help seeds to develop in some other alfalfa blossom.

Find jewelweed or touch-me-not pods just ripe enough to burst open at your touch and toss their seeds away. "Pop" a pod or two inside your hand and taste the butternut-flavored seeds.

In August or early September, look in lawns for a mushroom fairy ring. If you find a large one, other smaller fairy rings probably have grown there in years before, and still larger ones may appear in years to come.

leys; what floating materials, such as leaves, stems, or seeds, streams carry. Note the raindrop "dimples" on the surface of pools or ponds. Dip your hand into a muddy stream. Can you feel particles of soil carried by the water? Catch some muddy water in a bottle. How much silt settles out of it?

Observe the approach of a thunderstorm. Do *not* stand (1) in an open field, (2) under a lone tree or other tall object, (3) on a high exposed place, or (4) near a wire fence. Watch the clouds change, the lightning flash. Feel the wind and note its direction as the storm draws near. Note whether tree leaves show their undersides. Count the number of seconds between the lightning flash and the thunder clap, divide by 5, and you have the approximate distance in miles between you and the lightning flash. From what direction does the rain fall? How does the wind change it? Note the size of the raindrops, and how they bounce on a walk or pavement. Watch until the rain stops and the clouds break.

Learn when and where to look for rainbows.

Watch clouds: their changing shapes, colors, and motions. Use pictures to help you learn the types of clouds. What kinds of weather are different kinds of clouds likely to bring?

Rocks, Minerals, and Soils

The best place to begin to explore rocks and minerals is near home. Collect specimens (about as big as your fist is a good size) of all the kinds you can discover. Visit gravel pits, road cuts, excavations for buildings, rocky stream banks and such places. Visit a mine or a quarry if you can get permission to do so. Wash your specimens and break each so you can see a fresh surface. Did you find any fossils? Give each specimen a number (on a small piece of adhesive tape attached to it). Then, in your notebook, record the number of each specimen, its name if you know it, the place where you found it, and any other information you wish to preserve. Rocks, minerals, and fossils are difficult to identify. Probably you will need someone to help you. When you know something about those of your area, you can go on to learn about its geologic history.

Soils come, first of all, from rocks, but most soils contain, also, decayed plant and animal materials. How many different kinds of soil can you collect in the places you explore? Look for sandy soil, clay soil, and loam.

yellow-white? orange? Find the triangle marked by Vega, Altair, and Deneb—it is called the *summer triangle.*

Watch for meteors, often called *shooting stars.* You may see a few on any clear night, but August is the big month for them, especially after midnight on bright nights about August 11. A group of boys once camped out on a lawn at this time, and had fun taking hourly turns watching for and counting meteors through a whole night.

During the months of June, July, and August, the planets Venus and Mercury (June 16 to August 5), will be "morning stars"; Saturn, Jupiter (until August 4), and Mars (until August 16) will be "evening stars." Can you learn to distinguish them from each other and from true stars?

Beginning on June 5, 1955, at full moon, record the rising time of the moon each night as long as it rises before your bedtime. When does it rise at last quarter, June 13? As soon after new moon (June 19) as you can see the slender crescent moon in the west at sunset, begin a record of the day-by-day changes in the moon's shape. *Sky Laboratories* contains suggestions for records. If you cannot do these things in June, look on calendars for the dates of full moon, last quarter, new moon, and first quarter in July or August, and do it then. At what phases can you see the moon in the day sky? at what times of day?

Learn to tell time by the stars. Practice until you can do it well. Learn to tell directions by the stars. When you have done these things, I am sure you will want to take "star trail" photographs if you can. Many star books will tell you how to do all three things.

The Weather

Your textbooks and library books can give you all the help you need for many weather explorations, such as keeping weather records, making and using weather instruments, and becoming an amateur forecaster. You will find in *Air Laboratories,* the Leaflet for Fall 1953, many suggestions to try. But, do such things as the following, too.

Take a hike during some quiet, steady rain—dressed for rain, of course. Note how animals you see behave. Which seek shelter? Do any seem to enjoy the rain? Do any come out into the open when it rains? Observe how different plants shed (or hold) water; how water on the ground soaks in or gathers in little rills and makes tiny val-

Do leaves of some plants fold or droop? (Look at red clover.) What colors, if any, can you recognize? Can you recognize familiar trees by touch alone?

Some morning rise about an hour before the sun comes up. Watch the stars fade and the sun appear. This is your best time to hear and see birds. Many nocturnal animals are still about, too. You can see others rouse and begin their day.

Listen for summer sounds. How many can you recognize? Don't forget wind and water sounds, nor the soft whispering of leaves. Do you hear the same sounds at all times of day? in all places? every day?

Use your nose, your tongue, and your sensitive fingers as well as your eyes and ears. You will be surprised to discover how many plants and other things you can learn to recognize by smell, by taste, or by touch. You and your friends can play games (blindfolded) to try your skill. But be cautious. You will not want to test your abilities with poisonous or harmful things.

Some Things to Do

Keep Records

You may think when you start exploring that you can keep all the records you need in your head. But if you are a really serious explorer, you will want something more than that. What you choose depends on you. Here are some suggestions.

Nature Notes. Henry David Thoreau, of Concord, Massachusetts, was a great explorer of nature near home. During his life he filled two trunks with notebooks full of records of what he had seen and learned and thought. You may not explore so much nor so thoroughly as he did. But keeping a notebook will help you observe more closely and remember better the things you have discovered.

Your notebook should be a handy size to take with you. Looseleaf books are excellent, but any kind will do. A smooth, hard cover makes writing easier. Somewhere you should keep a page or two—perhaps one for each month—where you can put down reminders of things to do or to see later. Be careful to write clearly and accurately just what you discover—that is important. Record dates, and times, and places, too. Your notes may be very useful to you sometime—mine have helped me write these Leaflets.

You might like to begin with

Look for soils of different colors. Bottles or jars are good containers. Label each with the name of the sample, if you know it, and the name of the place from which it came. Become acquainted as well as you can with the soils of your area, and how they are used. Then you will be ready for the Spring 1956 Leaflet, which will deal with this subject.

Whatever You Explore

OBSERVE at different times of day, in different kinds of weather, and all through the summer. Move quietly and take your time. Persons who crash about and hurry rarely see much.

A magnifying glass is a great help. Often it opens a whole new world of tiny things to see and enjoy. One that magnifies from 5 to 10 times is a good choice.

Perhaps you are particularly interested in some one thing: birds, or flowers, or shells, or butterflies, for example. That may be your first reason to explore. But keep your eyes and ears and mind open for other things of nature, too. They all belong together, you know.

Some persons enjoy staking out a "claim"—an area perhaps only a yard square—and paying particular attention to it. You see small things and small happenings you might miss roaming far afield. Sometimes really big events occur.

Some day watch evening come. Write what you see and hear in your diary or notebook.

Explore nature at night. Go when the moon is bright, and again when the night is moonless. Visit different kinds of places. Sit or stand silently in the darkness. Once when I did this a screech owl flew close and clicked its bill at me—probably I was too close to its nest or its young. If you must move, do it slowly and quietly. Listen to night sounds. Watch fireflies and other night-flying creatures. Using a flashlight, learn what you can about the ways of earthworms and what insects do at night. Perhaps you know where some night-roaming mammal feeds. Patient waiting may give you an opportunity to play a flashlight on it—often without disturbing it if you move quietly. Look for "eyes in the night," reflections from animals' eyes of a flashlight or headlights. Are their colors different? Are flowers that you see open or closed?

such uses you will want only carefully chosen specimens, arranged so that you will be proud to show them. You should not collect rare plants nor their blossoms nor other rare objects. Permits are necessary to collect or to keep as captives certain kinds of animals, including most species of mammals, birds, and fish. You can learn about such things from the State Conservation Department or from game protectors.

You need special equipment to collect most kinds of things. Ways of preserving and mounting specimens differ, too. So, if you choose to collect, decide the kind of collection you want, then learn what you can about the best ways and places to get your specimens, and to care for, store, and display them.

Be sure to label each thing you collect with its name, your name, and where and when you found it. Sometimes short notes are valuable. It is a good plan to carry labels with you that you can attach securely to each specimen or its container when you collect it.

An ink print of a basswood leaf

Take Nature Photographs

Photographs are fun to take and fun to have. Probably some of you already "hunt with a camera," and know the thrill of "bagging your game" and yet being able to leave it for others to enjoy. A nature photographer needs special help to use special kinds of cameras and to take special kinds of pictures. I am leaving it to you to learn what you need to know from books or from other photographers. But good luck! The Nature Study Office would be delighted to hear about and see your "best." Perhaps you could contribute an illustration for a future Leaflet.

Take Outdoors Indoors

You will want to do most of your exploring out-of-doors, of course. But there will be stormy days and times when you want

a *nature diary*. Write *something* in it every day. You will be surprised how often you will refer to it to help you remember when or just where something happened. Sometimes you may not be able to find the names of things about which you write; but if you observe them well and describe them carefully, perhaps someone can help you name them later.

Lists and Calendars. Nature explorers keep lists of many kinds: trip lists, seasonal lists, year lists, and even life lists of birds, or flowers, or other things. It is a good idea to make a survey of the kinds of things in the particular area you explore, and to estimate about how many there are of each. Carefully kept lists or surveys, with dates and places where you saw things, often are of scientific value. They help you to discover changes and make it easy for you to compare one place or time with another.

A plaster cast record of a raccoon track in mud

Other Records. *Pictures* are good records, too—sketches or paintings you make, photographs you take, or even postcards or other pictures you collect. So are *plaster casts* of animal tracks or other things, *clay models*, *soap carvings*, and *prints* such as the leaf print on page 29. You can find help to make these things in several of the books listed on page 32, and in other books in your library. The Nature Study Office can send you mimeographed directions for making prints of several kinds.

Consider Collections

When you make collections, collect things (1) that you really want to keep; (2) that you, as a good conservationist, can collect with a clear conscience; and (3) that you have permission to take. You do not need to make collections of *things* to be a good nature explorer. But, like most persons, you may like to bring specimens home to learn more about them, to remind you of pleasant days, or to show to your friends. For

teachers, librarians, the county agricultural agent, a local forester, or a game protector. Exploring with someone else is fun, too. Usually some other person is interested in the same kind of nature exploration you plan to do. Together you may find things that you would not notice by yourself. And you may discover and correct mistakes—most of us make some.

Share Experiences

It is fun to *make* discoveries. It is fun, too, to share them with others. Perhaps you would like to set up your own private nature museum, or join a friend or two in establishing one. Or, you might enjoy making a backyard nature trail that would guide your friends to some of your discoveries and tell them things you have learned. After school begins you and some of your classmates could use summer discoveries to make a school nature trail. (The Nature Study Office can send you mimeographed suggestions for making nature trails.) The librarian who has helped you so many times might be pleased to have you exhibit at the library some particularly interesting discovery.

Why Explore?

EXPLORING—the kind we have been discussing—is the *only* way to gain really new knowledge. The facts we learn from books or from other persons, *some* explorer discovered. Your explorations may take you no farther than your own backyard. As you watch nature at work in her laboratory, you may discover nothing that someone has not already learned. But, then, too, you may—so much is still unknown. Either way, your discoveries will be new and exciting to *you*. You will learn what they teach you in the very best way anyone can learn. And you will have fun doing it.

Exploring and discovering make learning from others more fun, too. You find yourself wanting to check what you have found, and looking for more information and for new things to investigate.

So, explore! And may you make many discoveries!

something to do indoors—something that will help you when you go out again.

Listening to records of bird songs or frog choruses may help you to recognize sounds you hear outdoors. You often use books to tell you things you want to know. Have you found nature books to read just for fun? Perhaps your librarian or some of your friends can suggest some.

If you like to make things, you might consider an aquarium or a terrarium, plaster casts, leaf prints, or some of the other things suggested on page 28. You can make bird houses or feeding stations, and have them ready when you want them later. You can make equipment or arrange collections.

Look among your Leaflets and in your library for help to do such things. Many books and other materials besides those listed on page 32 contain directions and suggestions. Ask your teacher to let you use her Leaflet, *Indoor Nature Studies* (Fall 1954), to help you plan aquariums or terrariums. But remember not to get so interested in *making* things that you forget to *learn* about nature.

Often you see pictures in newspapers or magazines that concern your nature explorations. Why not make scrapbooks of such things? Looseleaf books are best so that you can keep together all your information about any particular thing. Be careful not to ruin books, magazines, or other things that are more valuable uncut.

Have a Conservation Project

More and more 4-H Clubs, Boy Scouts, Girl Scouts, Camp Fire Girls, and other groups of young people and their leaders are *doing something* about conservation. Look for things you can do. Two sources of suggestions, available from the Mailing Room, Stone Hall, Cornell University, Ithaca, New York are Cornell 4-H Club Bulletin 77, *Conserve Our Soil, Forest, and Wildlife;* and *The Conservation Corner* (a set of 10 leaflets), by Wilson F. Clark. A new set of bulletins (Dr. E. Laurence Palmer calls them the "Let's Build Something About Conservation" series), written by Dr. John Bulger, is published by the National Wildlife Federation, 232 Carroll Street, Northwest, Takoma Park, Washington 12, D. C.

Learn From Others

Of course you want the fun of discovering all you can by yourself, but in most neighborhoods are persons who can give you helpful hints. Among them are

Books and Other Materials

THE books listed on this page were chosen because each could help almost any nature explorer. Most of them suggest other useful references and materials for particular subjects. In most libraries you will find good books to help you name things and learn much about them. You will want to examine, too, books about nature study, hiking, camping, woodcraft and conservation.

Many past issues of the *Cornell Rural School Leaflet* will be useful. I hope you have a good collection of them at your school. Other helpful bulletins are available from Cornell University, and from many other sources. Look in such bulletins for reference lists.

The Book of Nature Hobbies. By Ted Pettit. Didier Publishers, New York City. 1947. 280 pages. Some 200 nature projects.

Field Book of Nature Activities. By William Hillcourt. G. P. Putnam's Sons, New York City. 1950. 320 pages. Many suggestions and much detailed help.

Hammond's Guide to Nature Hobbies. By E. L. Jordan. C. G. Hammond and Company, Maplewood, New Jersey. 1953. 64 pages. Detailed. Helpful.

How to Make a Home Nature Museum. By Vinson Brown. Little, Brown, and Company, Boston. 1954. 214 pages. Practical suggestions for collecting, arranging, and displaying natural materials.

Nature Quests and Quizzes. By Raymond T. Fuller. The John Day Company, New York City. 1948. 64 pages. 100 explorations to make, and 100 nature questions.

Nature Rambles: Summer. By Oliver P. Medsger. Frederick Warne and Company, New York City. 1932. 160 pages. Descriptions of things to look for and do.

Out of Doors, A Guide to Nature. By Paul B. Mann and George T. Hastings. Henry Holt and Company, New York City. 1932. 448 pages. Helpful suggestions and directions.

Summer. By Dallas Lore Sharp. Houghton Mifflin Company, Boston. 1914. 132 pages. Read this if possible.

Book of the Camp Fire Girls, Camp Fire Girls, Inc., New York City. 1953. 248 pages. *The Outdoor Book.* By Gladys Snyder and G. Frances Loomis. Camp Fire Outfitting Company, New York City. 1934. 127 pages. Much help on nature and other outdoor activities.

Girl Scout Handbook. Girl Scouts of America, New York City. 1952. 527 pages. Much helpful material on various subjects.

Scout Field Book. By James E. West and William Hillcourt. Boy Scouts of America, New York City. 1944. 540 pages. Well-illustrated suggestions for many summer nature explorations.

Published by the New York State College of Agriculture at Cornell University, Ithaca, New York. M. C. Bond, Director of Extension. This leaflet is published and distributed in furtherance of the purposes provided for in the Acts of Congress of May 8 and June 30, 1914.